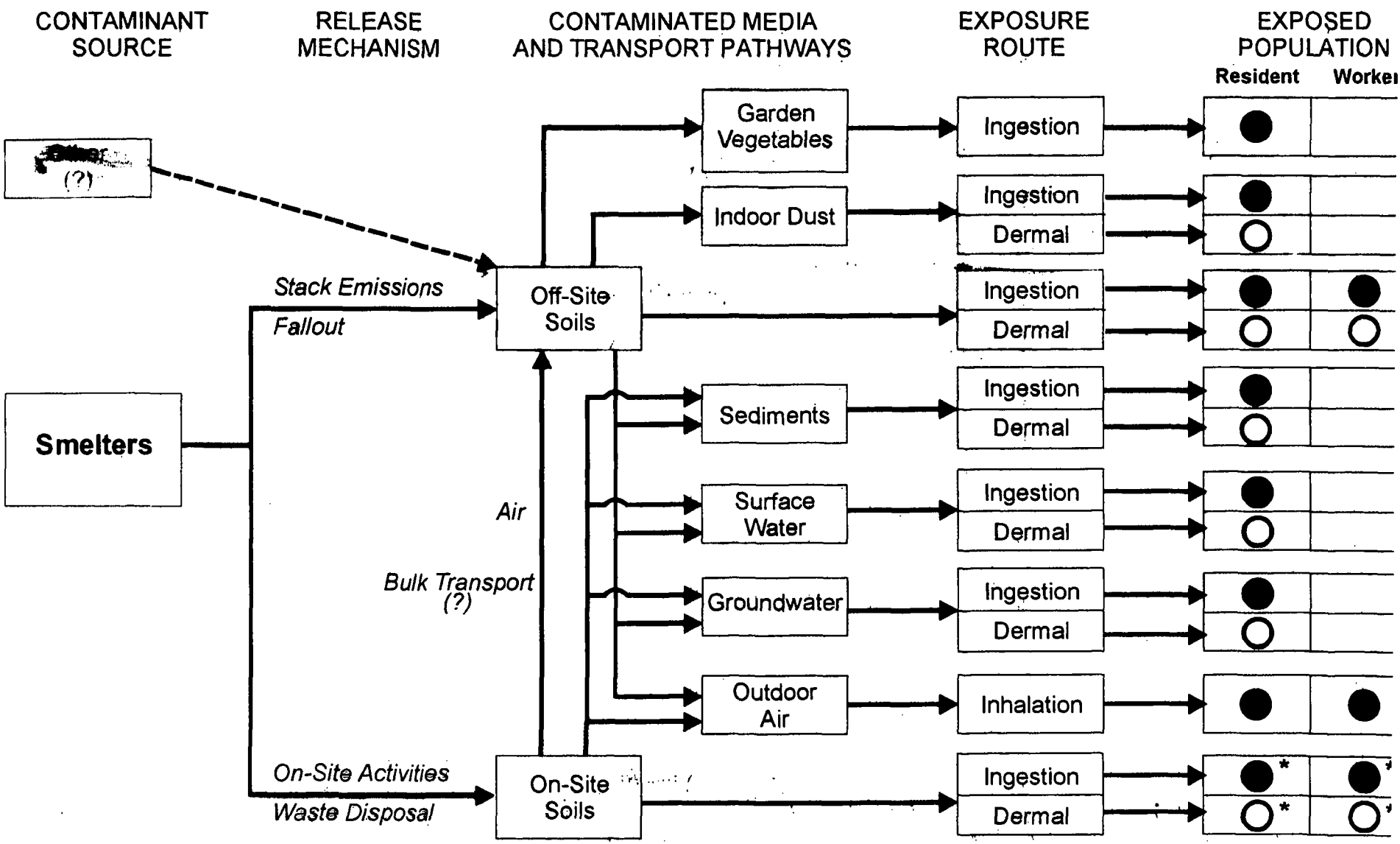
Draft Conceptual Site Model - Potential Human Exposure Pathways at Vasquez Blvd./I-70 Site



FEB 18 1999

RISK BASED SAMPLING

STUDY GOALS:

1. Characterize the nature and extent of arsenic, cadmium, lead, and zinc contamination within selected yards through intensive sampling

Why intensive sampling? To determine if the contamination is hot spot related or is uniform.

2. Quantify metals concentrations in dust, tap water, paint, and garden vegetables

3. Estimate recent exposure through monitoring of blood, hair, and urine

Data will be used in the baseline risk assessment

9/98 Work Group Meeting

PHYSICO-CHEMICAL CHARACTERIZATION OF SOILS

STUDY GOALS:

1. Determine the concentrations of arsenic, lead, cadmium, and zinc in the fine fraction of the 2400 surface soil samples collected in the spring of 1998

Why the fine fraction? EPA believes that this fraction is the primary source of human exposure to soil

2. Characterize the species of lead and arsenic in the surface soil and estimate the proportion that is likely to be available for absorption into the bloodstream through oral exposure pathways

9/98 Work Group ATG

facsimile
TRANSMITTAL

[redacted]

to: Nancy Strauss
fax #: (303) 759-5355
re: Letter to Governor Romer
date: October 9, 1998
pages: 3, including this cover sheet.

From the desk of...

Bonnie Lavelle
RPM
EPA Region 8

(303) 312-6579
Fax: (303) 312-6897

3:56 pm
Dave Ca
10-9-98

RISK: The probability of an adverse health effect occurring as a result of exposure to a constituent

11/12/98
WG

HOW WE EXPRESS RISK

1/10	0.1	10^{-1}
1/100	0.01	10^{-2}
1/1,000	0.001	10^{-3}
1/10,000	0.0001	10^{-4}
1/100,000	0.00001	10^{-5}
1/1,000,000	0.000001	10^{-6}

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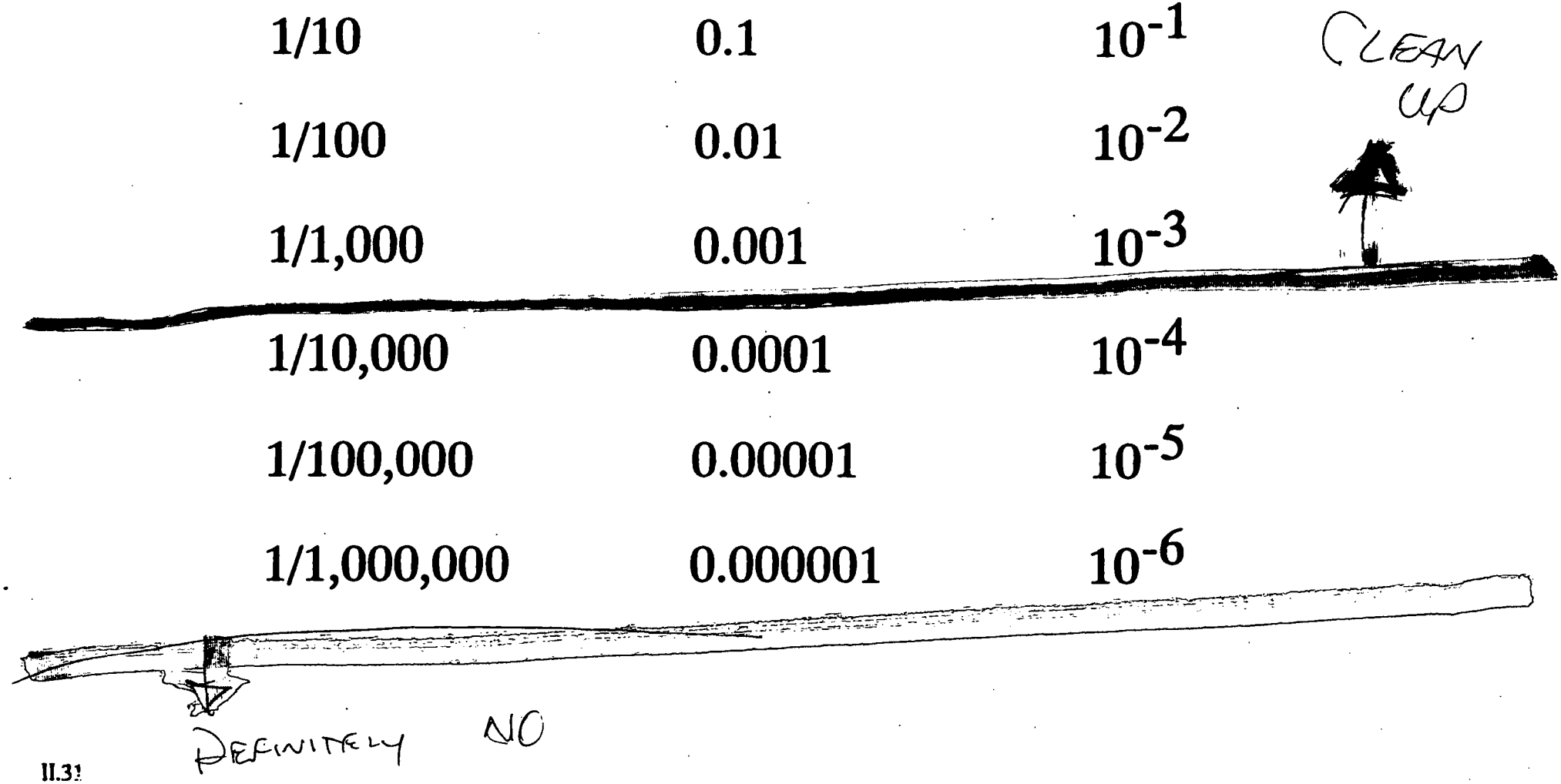
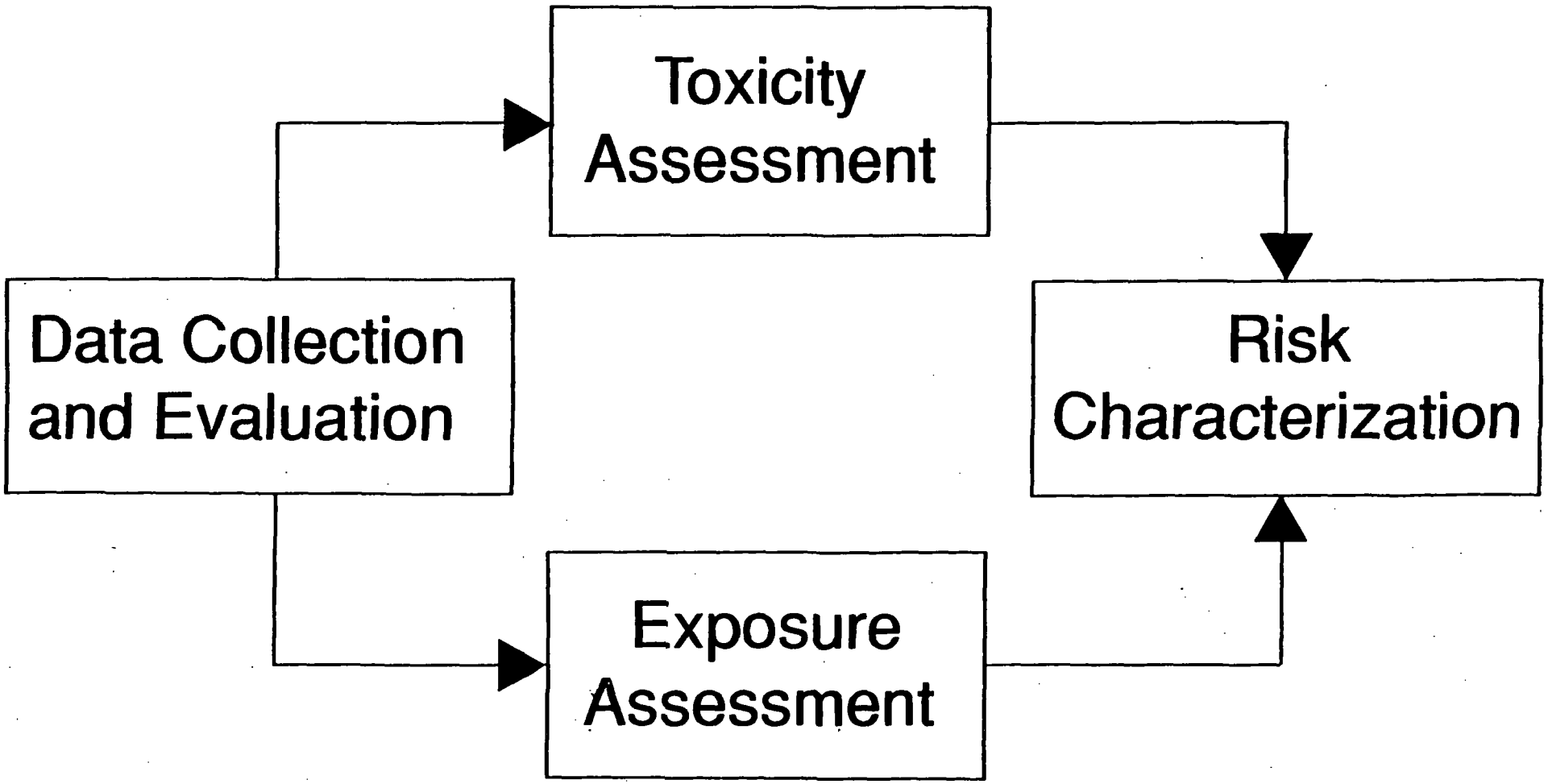


THE FOUR STEPS OF RISK ASSESSMENT



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HOW DO WE ENSURE DATA QUALITY?

- USE STANDARDIZED PROCEDURES
- USE EPA APPROVED LABORATORIES
- USE AN INDEPENDENT VALIDATION PROCESS

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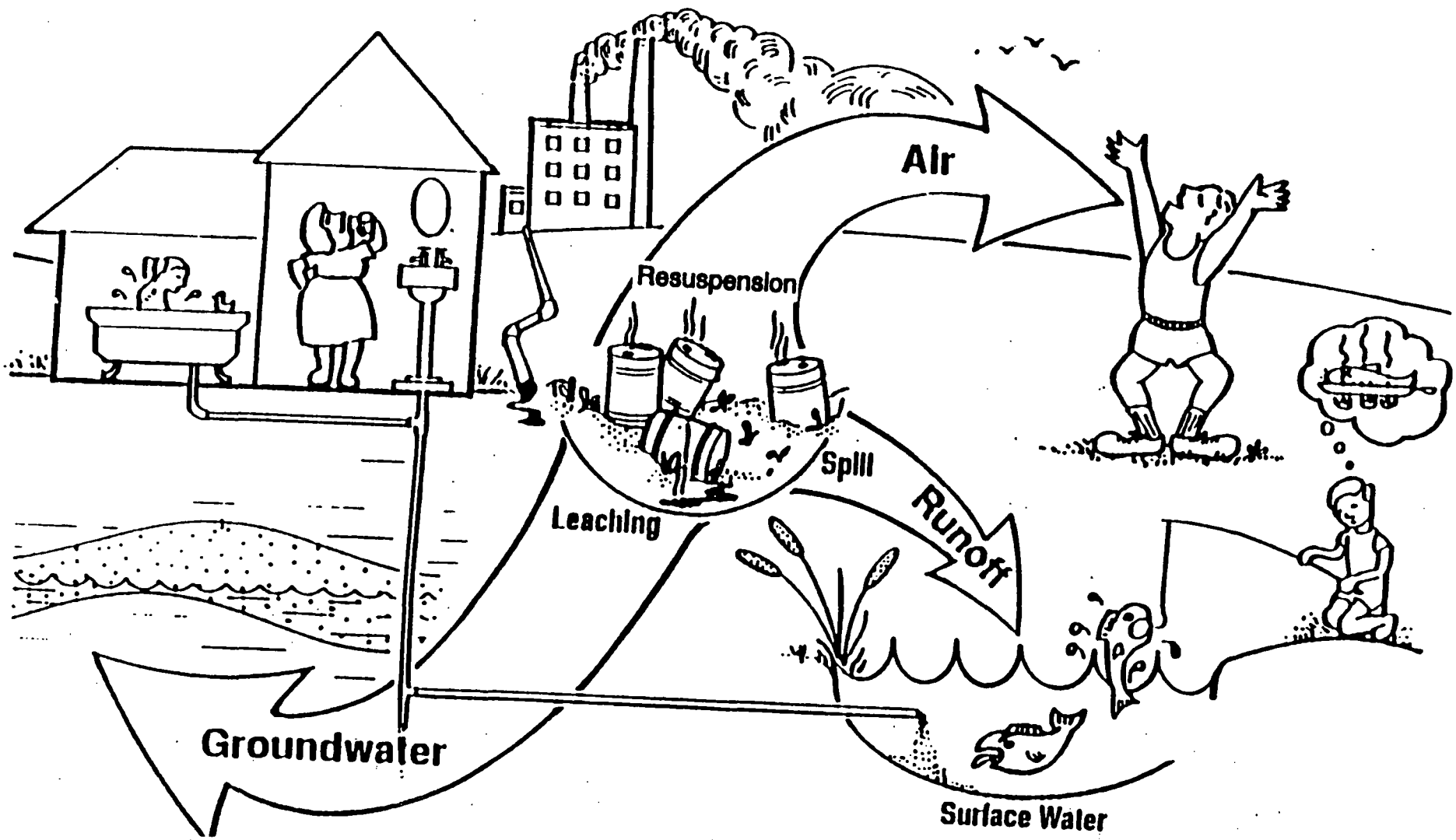
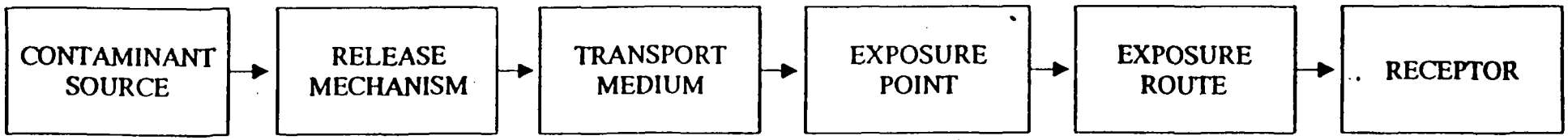
PATHWAYS



CONTAMINANT SOURCE	→	RELEASE MECHANISM	→	TRANSPORT MEDIUM	→	EXPOSURE POINT	→	EXPOSURE ROUTE	→	RECEPTOR

ELEMENTS OF AN EXPOSURE PATHWAY



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GENERIC EQUATION FOR CALCULATING CHEMICAL INTAKES

$$I = C \times \frac{CR \times EF \times ED}{BW} \times \frac{1}{AT}$$

I = Intake or dose; the amount of chemical taken into the body

C = chemical concentration; the average concentration contacted over the exposure period

CR = contact rate; the amount of contaminated medium contacted per unit time

EF = exposure frequency

ED = exposure duration

BW = body weight

AT = averaging time

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EXAMPLE EXPOSURE FACTORS FOR RESIDENTIAL SCENARIO

	CONSERVATIVE	*AVERAGE*
DAILY INHALATION	**20 CUBIC METERS**	**15 CUBIC METERS**
DAYS EXPOSED	**350 DAYS / YEAR**	**234 DAYS / YEAR**
YEARS EXPOSED	**30 YEARS**	**9 YEARS**
SOIL INGESTION	**120 MILLIGRAMS / DAY**	**60 MILLIGRAMS / DAY**

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SITE-RELATED INVESTIGATIONS

Activity	Status
Risk-based Sampling • Biomonitoring at 18 Removal Properties • Intensive soil sampling at 8 Homes • Indoor Dust and Garden Vegetable Sampling at Removal Properties	• Completed; Results available • Completed; Data undergoing final QA/QC review • Completed; Awaiting analytical data
Comparison of Contaminated Soil with Potential Source Area Soils • Full Metal Analysis • Bulk Soil Characteristics • Arsenic Particle Characterization • In Vitro Bioaccessibility	Proposed Project Plan nearing completion. Available for review by next meeting (March 4th)
In Vivo Bioavailability Testing	Feasibility is under review.
Characterization of Commercial Properties	Project Plan under development. Available for review by March 18th meeting.
Phase III Residential Soil Investigation	Conceptual study design under development.

2/99

BIOMONITORING RESULTS

Biomarker	N	Units	Detect. Freq.	Observed Values			Reference Range
				Non-Detect Range	Max. Detect	Geomean	
Blood Lead	15	µg/dL	15/15	--	4.0	2.2	10
Urinary Arsenic	15	µg/L	0/15	<10 - <20	<20	--	20
Hair Arsenic	15	µg/g	1/15	<0.3 - <1.3	0.41	--	1

ACCEPTABLE RISK

For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}...

- National Contingency Plan -

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